Scenarios Development and Access

NCADAC Meeting

November 16-17, 2011

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Pacific NW National Lab, U of Maryland

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Acknowledgements

- Members of Working Group 3

  Timothy Bennett, Lynne Carter, F. Stuart Chapin, Camille Coley, Plácido dos Santos, Paul Fleming, Guido Franco, Gary Geernaert, Aris Georgakakos, David Hales, John Hall, Anthony Janetos, Chester Koblinsky, Jo-Ann Leong, Philip Mote, Jayantha Obeysekera, Lindene Patton, Sara Pryor, Henry Schwartz, Donald Wuebbles, Virginia Burkett, Holly Hartmann, Ken Kunkel, Adam Parris, Marc Perry, Bob Vallario, Adrienne Antoine, Dan Cayan, Mary Culver, Isaac Held, Radley Horton, Linda Mearns, Jerry Meehl, Paul Scholz, Leigh Welling, Kevin Knuuti

- Ken Kunkel
- Adam Parris
- Holly Hartmann
- Bill Emanuel
- Others too numerous to name

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Topics

- Background of prior NCADAC decision
- Climate
- Sea level change
- Land use and socioeconomic
- Participatory planning
- Dissemination, next steps

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Background

- Overview of agreed scenarios strategy
  - Provide and use four types of scenarios: climate, sea level, land use, and socioeconomic
  - Explore scenario planning process in pilot studies
- Use of scenarios
  - Provide context of range of potential future conditions for calibration of existing literature and other purposes
  - Quantitative scenarios available for modeling

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Climate Scenarios

- IPCC Special Report on Emissions Scenarios, B1 and A2 used as framing scenarios
  - Minimum set, other scenarios encouraged
- Climate change outlooks
  - User-oriented descriptions of state of knowledge of regional (and national) conditions and trends
  - Drafts completed for regions and at national scale
  - Request for review (expert and stakeholder)

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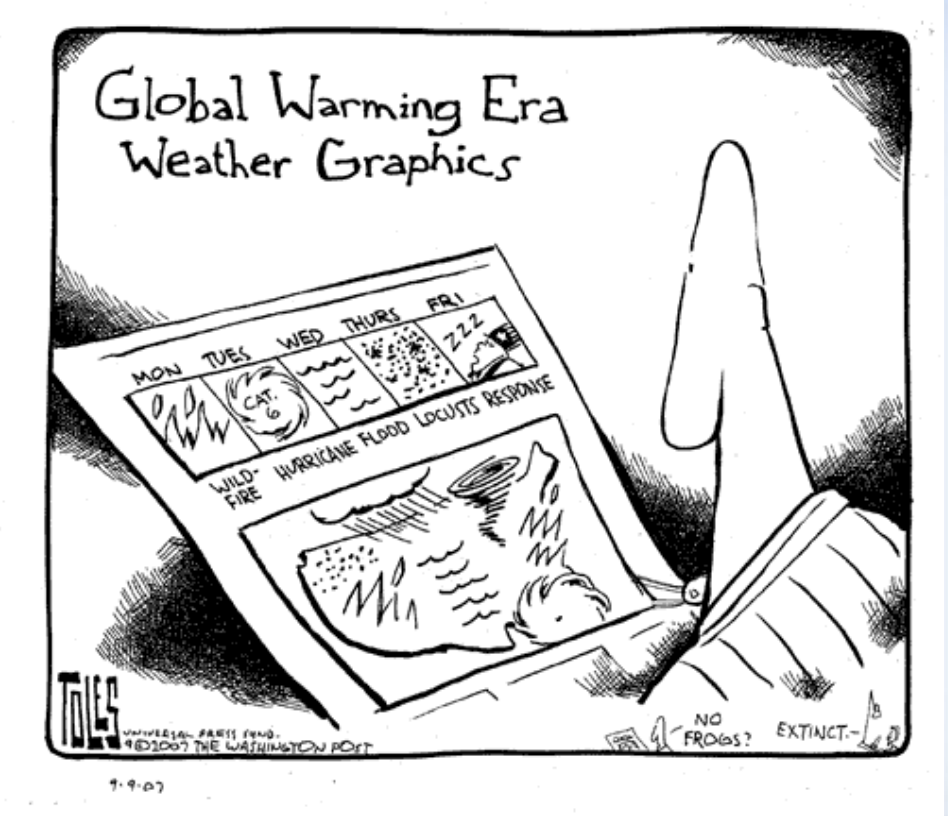
Climate Data Sets

- Global climate model results as used for 2009 report (A2 and B1)
- North American Regional Climate Change Assessment Program (NARCCAP) results
- Maurer et al. statistically downscaled monthly data
- Daily version of Maurer et al. data produced by Katharine Hayhoe



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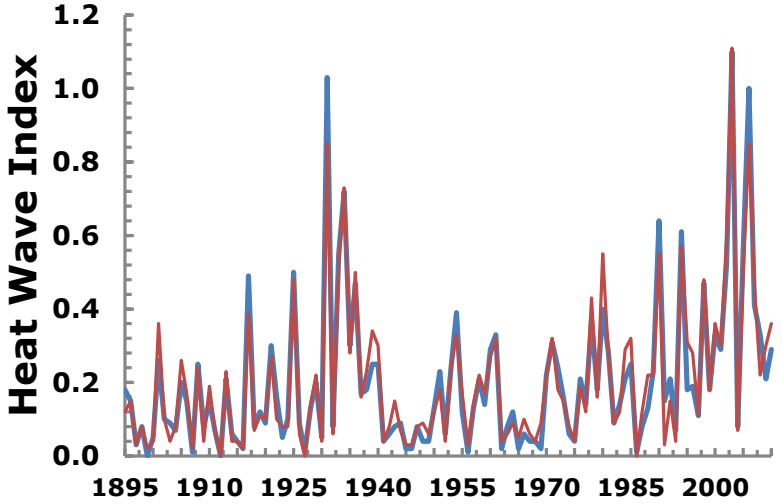
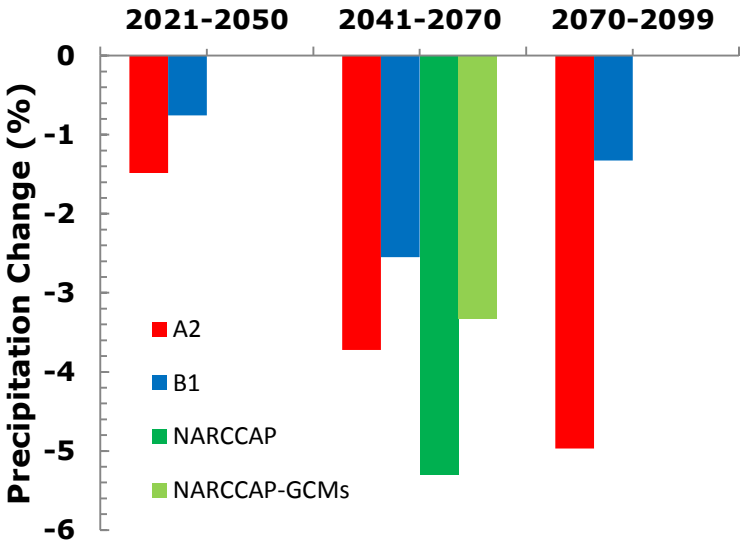
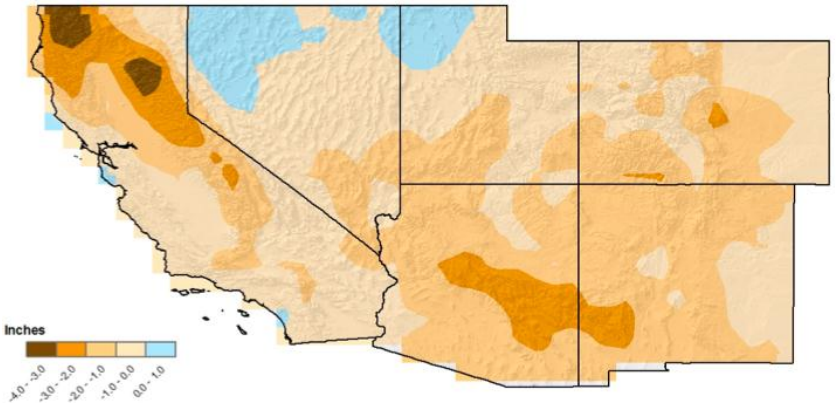
Southwest Regional Climate

- **Maps of mean annual temperature and precipitation.**
- **Major climatic factors, e.g., drought, heat waves, winter storms, flash floods.**
- **Trends:**
  - Seasonal and annual temperature and precipitation;
  - Precipitation extremes (daily 5 year storms);
  - Temperature extremes (4 day, 1 in 5 year events); and
  - Freeze-free season length.





NARCCAP, Change in Annual Precipitation
2041-2070 minus 1971-2000



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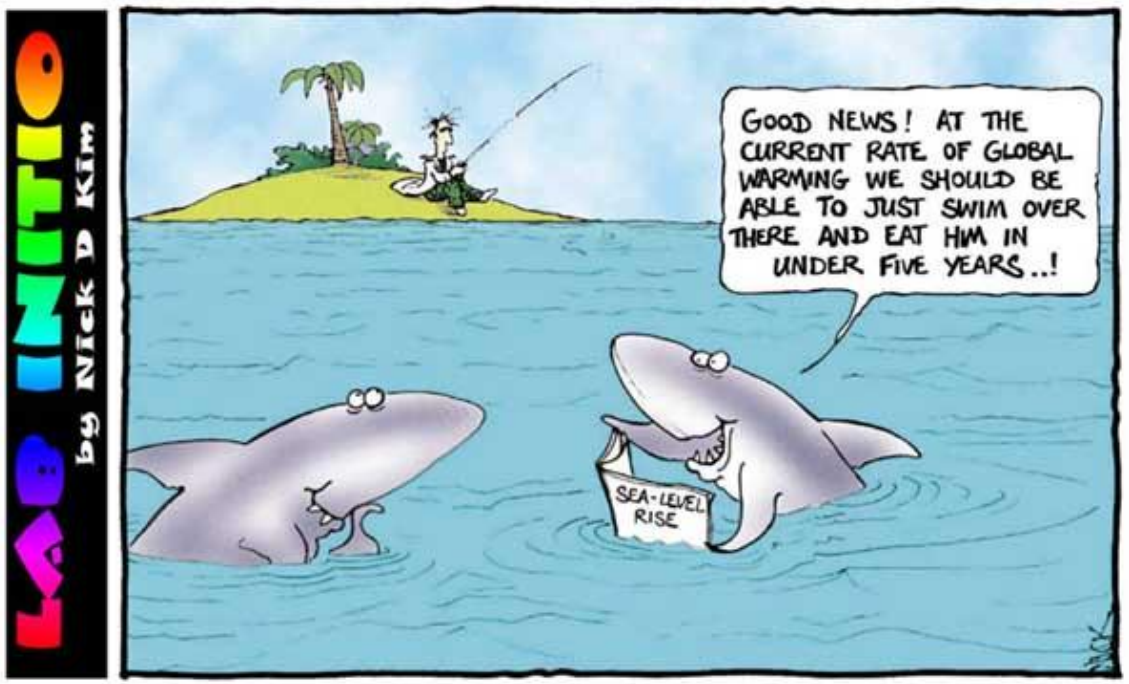

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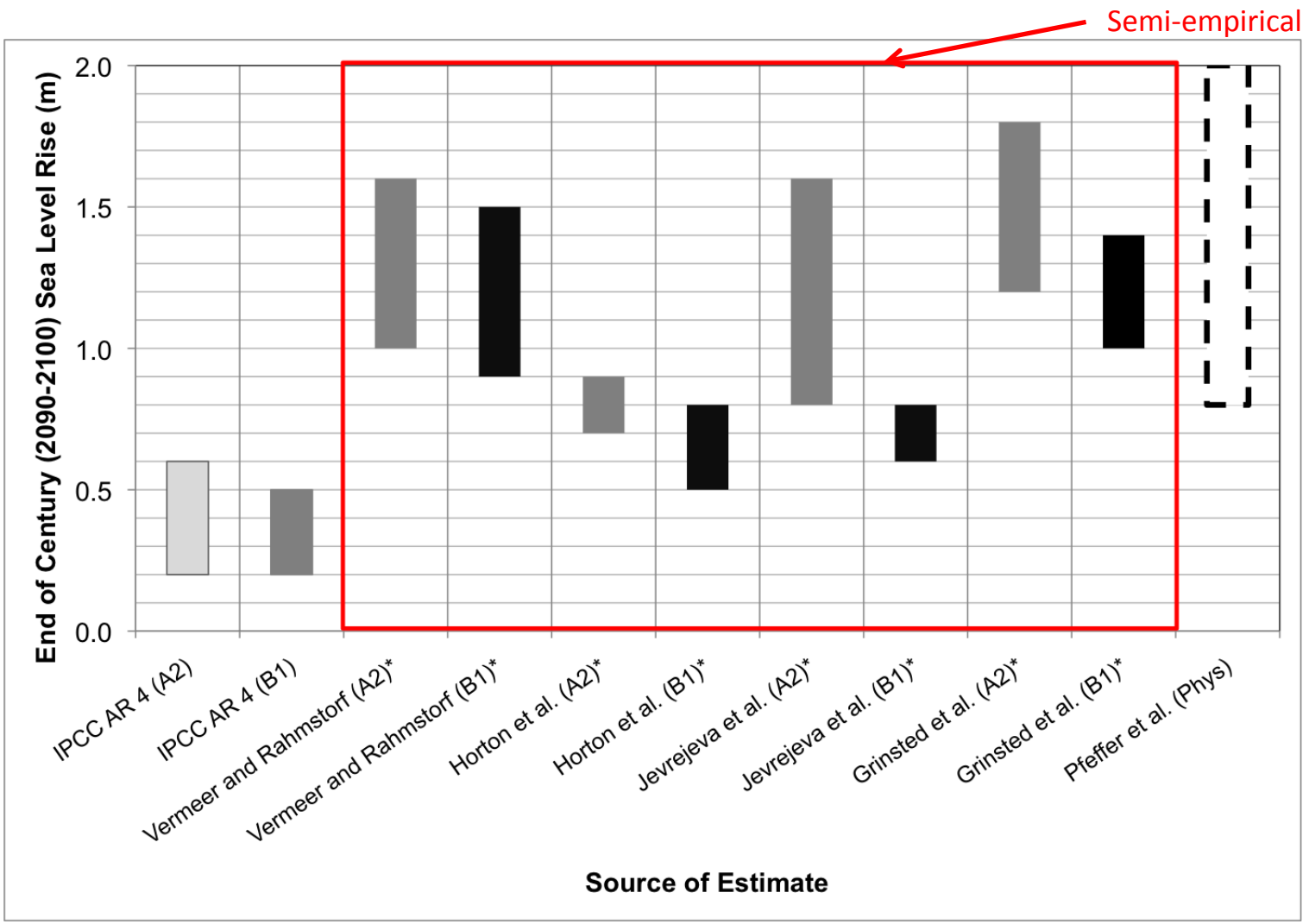
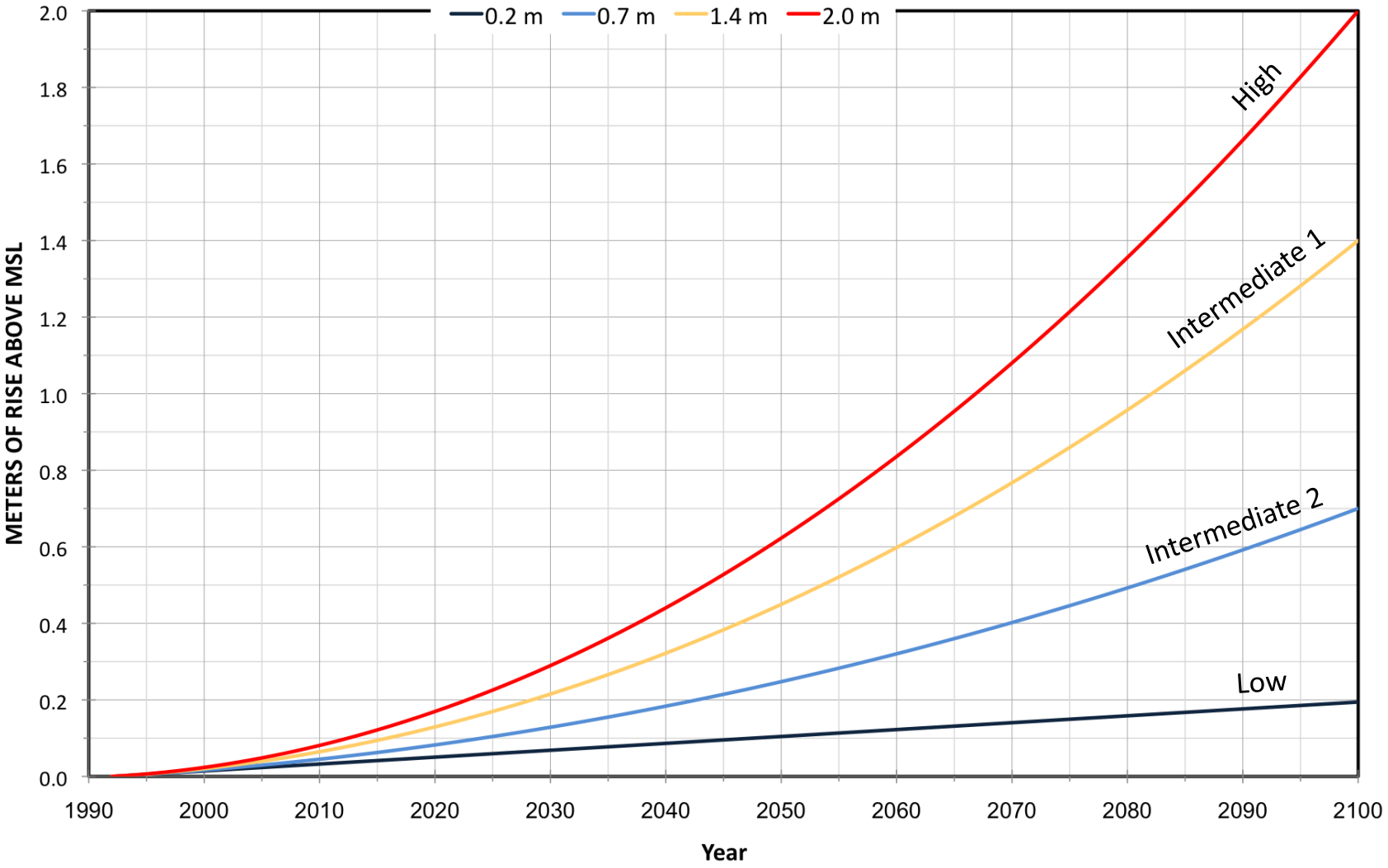
Why Sea Level Change Scenario (SLCS)? Post AR4 literature



Sea Level Change Scenario (SLCS)

- Global Mean Sea Level Rise Projections – Year 2100
  - Curves fit to 1992 reference point and 2100 end points
  - High: 2.0 m (Pfeffer *et al.* 2008)
  - Intermediate 1: 1.4 m
    - Average of semi-empirical studies consistent with SRES scenario A2 at 95% confidence
  - Intermediate 2: 0.7 m
    - Average of semi-empirical studies consistent with SRES scenario B1 at 5% confidence
  - Low: 0.2 m
    - Extrapolation of observed historic rate
    - At 2100, similar to results under B1 at 5% confidence

Global Mean SLR Curves



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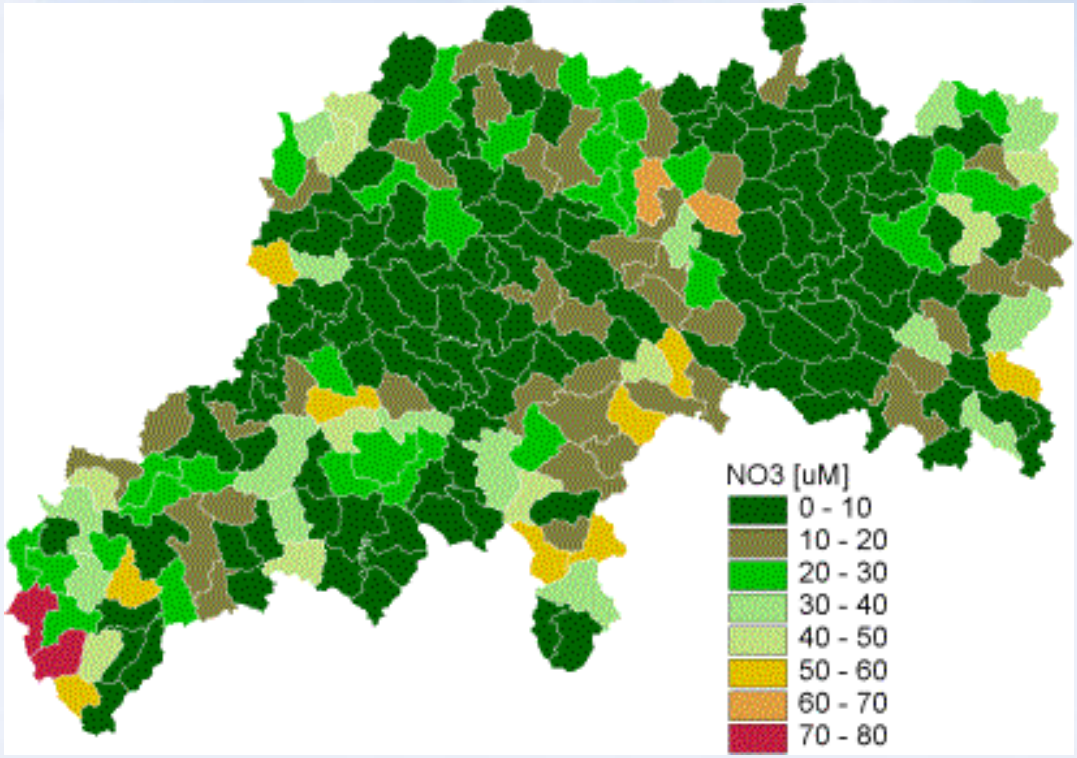

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Land Cover and Land Use

National Land Cover Database (NLCD) 2006 as a baseline characterization of land cover

- USGS provided summaries of areas by land cover type within counties, states, and NCA regions
- USGS is finalizing a 10 km x 10 km aggregated version of the data
- Various Government assessments use NLCD 2006

Projections for immediate use

- EPA Activity to Integrate Climate and Land Use (ICLUS) (Published)

Additional resources

- USDA Forest Service Resources Planning Act Assessment (Draft for public comment)
- USGS Carbon Stocks Assessment, Energy Independence & Security Act (Underway)

NLCD Land Cover Classification Legend

- 11 Open Water
- 12 Perennial Ice/Snow
- 21 Developed, Open Space
- 22 Developed, Low Intensity
- 23 Developed, Medium Intensity
- 24 Developed, High Intensity
- 31 Barren Land
- 41 Deciduous Forest
- 42 Evergreen Forest
- 43 Mixed Forest
- 51 Dwarf Scrub*
- 52 Shrub/ Scrub
- 71 Grassland/ Herbaceous
- 72 Sedge/ Herbaceous *
- 74 Moss *
- 81 Pasture Hay
- 82 Cultivated Crops
- 90 Woody Wetlands
- 95 Emergent Herbaceous Wetlands

* Alaska Only

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Socioeconomic Factors

PNAS

National housing and impervious surface scenarios for integrated climate impact assessments

Britta G. Bierwagen[a], David M. Theobald[b,1], Christopher R. Pyke[c], Anne Choate[d], Philip Groth[d], John V. Thomas[e], and Philip Morefield[a]

[a]Global Change Research Program, National Center for Environmental Assessment, Office of Research and Development, US Environmental Protection Agency, 1200 Pennsylvania Avenue NW, Washington, DC 20460; [b]Department of Human Dimensions of Natural Resources and Natural Resource Ecology Lab, Colorado State University, Fort Collins, CO 80523; [c]US Green Building Council, 2101 L Street NW, Suite 500, Washington, DC 20037; [d]ICF International, 1725 Eye Street NW, Suite 1000, Washington, DC 20006; and [e]Development, Community, and Environment Division, Office of Policy, Economics, and Innovation, US Environmental Protection Agency, 1200 Pennsylvania Avenue NW, Washington, DC 20460

- Based on story lines derived from SRES scenarios A1, A2, B1, and B2.
- Base-case scenario consistent with the U.S. Bureau of the Census midline U.S. population.
- Projections to 2100 using:
  - A county-scale demographic model; and
  - Spatial allocation model to distribute projected population into housing units across the landscape at 1 ha scale.
- Geospatial data for conterminous U.S. available through a Web interface.

Other Resources:

- Historical trends and current conditions (1981-2010)
  - State, regional, and national.
- Mid-Century projections consistent with, at a minimum, SRES A2 and B1 scenarios (2041-2050).
  - Regional, national.
  - U.S. Government sources (e.g., Census Bureau) provide projections to ~2035.
- Long-term projections to 2100, consistent with, at a minimum, SRES A2 and B1 scenarios.
  - National.
  - Integrated assessment model results and published research studies.

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Participatory Scenarios

- An option for regional and sectoral teams to work with subgroups of stakeholders
- Integrates science-based scenarios with stakeholder engagement that increases relevance of knowledge
- Can start with non-climate planning activities and get stakeholders to explore climate change relevance
- Extends beyond impacts, to adaptation

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Scenario Planning Activity

Steps

1. Select participants and focus issue(s)
2. Analyze potential impacts and prioritize most important risks
3. Construct adaptation scenarios
4. Assess implications for decision making
5. Document and evaluate the process

Scenarios

- "Big Problems, Little Capacity" – A2 climate and logic, slower economic development, higher population growth, limited environmental concern, sprawling urban development, higher impervious area, intrusion into ecosystems.
- "The Best Chance You'll Get" - B1 climate and logic, higher per capita GDP, slower population growth, sustainable development, compact urban areas, smaller extent of impervious surfaces, less intrusion on ecosystems.

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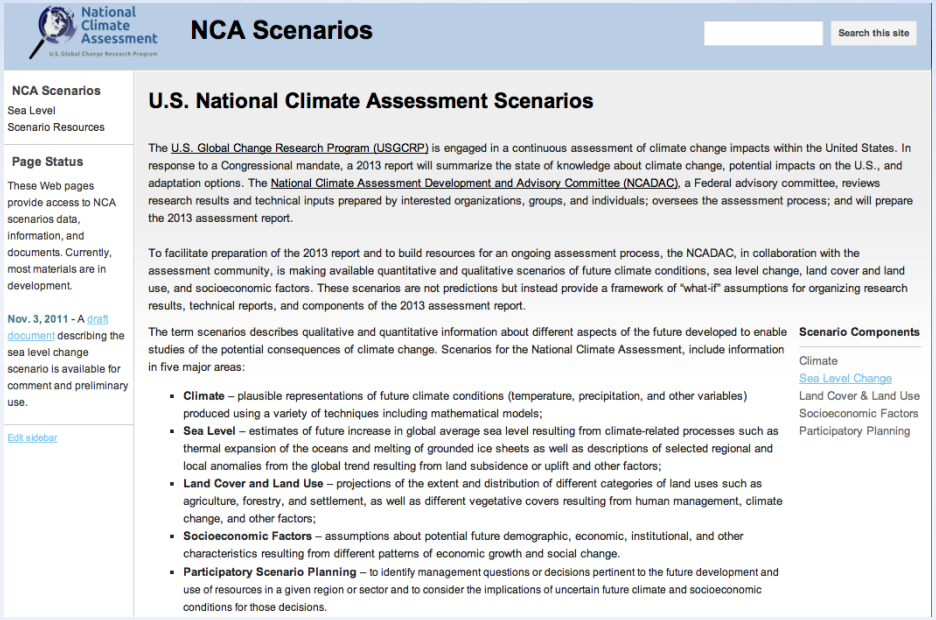
Dissemination



- Vision: single point of access, distributed archive
- Google Sites for near-term access
- Overall NCA information and collaboration system in intermediate term
- Data distribution and support through Global Change Information System for long term

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Next Steps

- Working Group 3 will continue to meet consistent with its terms of reference
  - Review additional implementation steps including dissemination
  - Provide input on future scenario needs to sustained assessment group
- Could serve as WG for uncertainty guidelines implementation, although these may be better placed with the topic of "risk"

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Review Requests/Opportunities

- Climate change outlooks
  - December 23, 2011
- Special requests for climate information
  - January 2, 2012 for technical report teams
  - May 1, 2012 for LA teams
- Sea level change scenario document
  - February 17, 2012
- Participatory process request and opportunity
  - Inventory ongoing scenario planning activities
  - Undertake a pilot scenario planning activity – requests for facilitation or support at CLA meeting, Jan 2012

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Discussion